# Technical Support Document

## Ships and Ports Measures

## Summary and Analysis of Comments

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## Impact of User Fees on Port Usage

Comments

Several commenters argued that the proposed fee-based program would send discretionary cargo to other West Coast ports, which would adversely affect both the San Pedro Bay ports and the local economy. These commenters generally estimate that up to 40 percent of the cargo that passes through their ports is discretionary, meaning that it is not produced or destined for use in the area and thus could easily be shipped into or out of the country through other ports. They argued that the proposed port user fee would raise the costs of doing business at the San Pedro Bay ports to such an extent that it would be economically beneficial for marine vessels to use other West Coast ports even if they do not have all the location and operational advantages associated with the South Coast ports. This would result in a loss of business for the San Pedro Bay ports, which in turn would result in loss of jobs and tax revenues for the area. These commenters reminded EPA that the Ports of Los Angeles and Long Beach are one of the few sectors of activity in the South Coast that have actually seen growth in the past few years, and continued growth should not be discouraged.

Marvin Braude of the City of Los Angeles asserts that the FIP should not impose disproportionate burdens on the region that put it at a substantial competitive disadvantage. Those types of burdens only succeed in diverting emissions, as well as jobs and business, to other regions, as shippers take their business elsewhere. In addition, the City of Los Angeles opposes fees that end up in the Federal Treasury; economic incentives should not be used to balance the federal budget. The City notes that, as proposed, the fee programs will result in severe economic impacts on the regional economy without providing significant emission reductions. They are primarily punitive as they would only result in fewer pollutant emissions by reducing pollution-generating activities, not by actually reducing the emissions caused by such activities. Curtaining of the activities would result in a further weakening of the region's economy.

Anthony Taorimina of the Port of Hueneme suggests that the Harbor Maintenance Fund be used as a model for a national control strategy. Under this program, fees are assessed on the cargo that moves through each port, rather than the individual vessels. The air emission fee could be reduced by using a cleaner-burning vessel engine and therefore functions as a built-in incentive for vessel operators to provide their customers with ships powered by low-emission engines. Also, this model could be used throughout the entire intermodal transportation network, touching both the trucking and rail industries, with incentives for all to use cleaner engines. Fees collected could be specifically restricted for use in implementing low-emission technologies, or could be returned to the air district within the port of entry from which the cargo was exported or imported.

Anthony Taorimina of the Port of Hueneme also supports a port bubble for small port facilities, that would apply only to operations within the commercial seaport. If a port's total emissions inventory exceeded the maximum standard for any one year, the Port Authority would agree to impose a fee for the overage at a predetermined rate. That fee

would be assessed among all port users under its Port Terminal Tariff. The fees could be used (1) to provide infrastructure for vessels at the Port to reduce vessel emissions; (2) to provide for the reduction of other mobile source emissions directly attributable to port operations; (3) to use for other general emissions reductions. However, Mr. Taorimina stated such a bubble would not be effective if it were expanded to a transportation bubble, encompassing locomotives and trucks over a wide region. The bubble concept should be limited to the operations which are conducted on port property and are under the jurisdiction of the port authority, by virtue of cargo-handling permits or terminal agreements.

Response

While there is no fee program in the final rule, EPA believes that a port user emissions-based fee could be developed with minimal impact on the use of the ports. Mr. Taorimina's ideas could be used. Additionally, if a fee was collected by the ports and used to offset other charges then the costs of using the ports would not have to increase.

EPA hired a consultant to develop a comparison of the San Pedro Bay Ports and other West Coast Ports[1]. That study shows that the impact of the user fees on the comparative advantage of the San Pedro Bay ports is uncertain. The size of the fee paid would depend upon emissions levels; it is unclear whether actual user fees would raise transportation costs so high that ship owner/operators would prefer to use other West Coast ports. Therefore, it is hard to say with any certainty whether such diversion of cargo will occur or, if it would occur, to estimate its magnitude.

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[1]"Comparative Analysis of West Coast Ports," prepared for United States Environmental Protection Agency by ICF Incorporated, dated September 30, 1994.

## Fee Calculation

Comment

Several commenters stated that the example port fee that EPA calculated in its preamble understated the port fee that shippers would actually have had to pay under the proposal. Bob Kleist of the Maritime Coalition for Clean Air asserts that the fees would be more than $16,000 per ship call; they would exceed $100,000 per ship call. Geraldine Knatz of the Port of Long Beach states that when actual operations are taken into account, the fees would be approximately $31,000 to $104,000, and the increase in average port charges per ton would be 50% to 170%. She claims that would be a cost of $154,000 per ton of NOx reduced.

Response

While there is no fee in the final rule, EPA would like to respond to these comments. EPA acknowledges that its example fee was inadvertently on the low end of fees that could be charged. The Agency would like to note that when using the ports own data the actual fee has a very wide range (from 32 to 100 thousand dollars). If any emission reducing activity were undertaken, the range would stretch even lower, and as proposed no fee would be charged for very clean ships which met the operational qualifications for a discount.

## Geographic Implementation

Comment

Anthony Taorimina of the Port of Hueneme states that the port supports EPA's strategy not to impose fees on ships calling at that port. He also believes that if EPA elects to impose fees on the vessels calling on the San Pedro Bay Ports, a credit should be allowed for ships calling at Port Hueneme provided that the vessel operator uses reasonable efforts to use a trade route that limits transit time within the Ventura County Air Basin.

Response

EPA agrees that if a fee program is instituted to encourage ships to go outside the Ventura Air Basin that fee should not apply to ships which have business within the basin.

## Emission Reduction Technology

Comment

Several commenters noted that the discounts for the port user fee depend on the availability of the relevant technologies in 2001, when EPA's program would go into effect. Yet, these commenters note, much of this technology is not currently available and it is unclear whether it will be available in time. It is also not clear that cleaner technologies can be installed on existing ships; for example, some commenters stated that techniques for retrofitting Selective Catalytic Reduction (SCR) are not yet perfected for transient operations. Other commenters asserted that some modifications necessary for retrofitting could result in safety hazards; that many of these technologies are untested at this time, and difficulties persist in their development; and that the cost of retrofitting emission control technologies for large vessel engines would be high.

However, not all commenters were so pessimistic about the ability to achieve the NOx emission reductions. Some commenters, for example, pointed out that NOx emission reductions are currently being achieved using available processes and technologies. For example, one commenter noted that large emission reductions may be achieved through the use of steam or gas turbine engines, which are already available and used on many ships. In addition, NOx emission reductions can be achieved from operational changes or minor technological changes, such as injection timing retard, engine fine tuning, and selective non-catalyst reduction.

Finally, many commenters stated that EPA should concentrate its efforts on ensuring that the IMO standards are finalized as early as possible and that these standards are as low as technologically feasible. These commenters noted that the implementation of worldwide standards for marine vessels could reduce vessel-related NOx emissions in Southern California without any deleterious effects on the local economy. The ports claim that as currently planned, the IMO standards would achieve a 7 percent decrease in NOx emissions from ships in 2010.

Response

EPA has been working with the international community, through the International Maritime Organization, to develop the lowest possible standards for NOx emissions from marine vessels. These standards would apply to marine vessels flagged in any country. This international effort is proceeding at this time, and it is anticipated that the standards, which are expected to require at least a 30 percent reduction in emissions, will go into effect for engines manufactured in 1999.

The Ports' assumption that a 7 percent emission reduction will be achieved through the IMO standards is reasonable. This reduction will be achieved if approximately 23 percent of the vessel trips at the San Pedro Bay ports in 2010 be by vessels that meet the IMO standards. Twenty-three percent of the ships would need to be equipped with engines

10 years or younger, since the IMO program is expected to be implemented in 1999. EPA believes it is reasonable to assume that this goal can be achieved through natural turnover, since approximately 10-20 percent of the ships in U.S.-flagged fleets are currently 10 years or younger, and since the container ships that are used on the trans-Pacific routes tend to be newer vessels.

## NOx Emission Rate Equation

Comment

Several commenters disagreed with EPA's proposed method of determining the NOx emission rate from a ship's engines. The proposed NOx emission rate equation is based on the equation the IMO plans to use for its NOx emission standard. Several people claimed that the NOx emission rate calculated using this equation is higher than the emissions that actually occur, especially for those engines that operate at less than 130 RPM.

Response

The proposed NOx emission rate equation is a modified version of the equation used for setting the IMO standards. The curve was developed by applying a best fit to the data available, much of which was for the slow speed diesel engines. The IMO, in setting its standard, did not apply the equation to engines with RPM less than 130. Below that speed the equation gave increasingly higher values for emissions and the IMO did not want to allow ship emissions to be that high.

No commenter gave any data or other information showing that on average for modern diesel engines that the equation did not apply. Therefore, although unimportant because there is no fee calculated from the equation, EPA continues to believe that the equation is a reasonably accurate predictor of the emissions rate of modern diesel engines.

At the same time, EPA recognizes that this equation may overstate the NOx emission rate for older engines. However, the proposed program contained a method by which a ship owner/operator could submit data about a particular vessel's emissions, and that data could be used to calculate the NOx emission rate.

Cold Ironing

Comments

Some commenters noted that cold ironing will be problematic because most ships are not currently equipped to handle shore-generated electricity. In addition, many foreign ships require electricity with a frequency of 50 hz while California supplies electricity at 60 hz. This difference would require a ship to completely shut down electrically before the shore power can be energized or de-energized, which can be time consuming and dangerous.

Anthony Taorimina of the Port of Hueneme asserts that, until the IMO has standardized the regulations for construction of shoreside power connections in vessels, and other shoreside infrastructure impediments have been adequately addressed, shoreside power will continue to be both economically and operationally infeasible for deepdraft vessels.

He notes that the economics of shipping requires ships owner/operators to keep the ship in motion. As a result, some vessels spend no more than eight hours in port and, in this case, the gains made from hooking up to shore power are minor and do not justify the necessary expenditures to provide them with that power supply. Other ships take more time to move their cargo and need a large supply of power to keep their cranes and other equipment functioning in order to load and unload the vessel in the shortest amount of time possible. Also, few ships have been constructed with the necessary connections to handle shore power.

Finally, small ports like the Port of Hueneme run into capital investment barriers with regard to providing shoreside electric power for ships. Vessel operators calling at the Port of Hueneme do not have large investments in shoreside facilities, do not utilize shoreside gantry cranes but rely on vessel gear, do not have long term lease agreements, do not construct vessels for the specific trade route, and do not call on a fixed schedule. These variables make the feasibility of shoreside power for the Port of Hueneme impractical. Widespread differences among the ships that use berths make any standardization of equipment extremely difficult.

Mr. Taorimina also questions the feasibility of supplying the required amount of power to ports, especially since port electric needs will not be constant (one day there may be 5 ships in port, the next there will be two or less). This can potentially cause problems for both the port and the local power company in guaranteeing that the necessary power is available to each vessel whenever it may arrive and subsequently reduces the ability of the public port authority to recapture any investment in shoreside power installation.

Seaworthy Systems, Inc. (SSI) believes cold ironing is problematic for several reasons. Few large commercial vessels are built with cold ironing capabilities, and few berths are equipped to supply them. Many foreign ships have electrical systems with frequencies of 50 hz while the electricity supplied in California is 60 hz. A ship cannot be paralleled with 60 hz shore power and must be completely shut down electrically before the shore power can

be energized or deenergized.

SSI also notes that reconfiguring a vessel to handle shore power is very expensive; this is more practical for new ships. However, this is a costly alternative, they estimate $28,000 per ton of NOx emissions reduced. Ports would have to provide electricians to connect the ships; those electricians would have to be able to speak the language of the crew. On-board systems would still be necessary to keep the engine block warm. The requirement that ships engaged in hazardous operations or carrying hazardous cargo get underway in 30 minutes may prevent cold ironing.

Coast Guard representatives noted that there are several safety issues associated with cold ironing. For example, ship-generated electricity may be needed for fire fighting equipment, required navigation lights, deck lights, and communications. Service generators may be needed to provide an inert gas blanket on the cargo tanks of tank vessels off-loading crude oils. Also, the non-routine activities associated with cold ironing may be conducive to human error. Crew health and safety may be at risk if basic hotelling services (e.g. air circulation, lighting, etc.) are unreliable or unavailable.

Response

EPA recognizes these concerns and does not seek to create a hazardous situation. EPA only proposed cold ironing for those ships which believed it was cost effective for them. EPA will study the benefits and costs of cold ironing as part of the study described below. Until the issues surrounding cold ironing can be resolved, EPA is only requiring cold ironing for tugs.

## Distance from Shore

Comments

Although commenters generally were not opposed to keeping ships away from the shore when navigating in waters Northwest of the San Pedro Bay ports, several noted that the 70 mile limit was inappropriate. Such a large distance, they asserted, would increase the amount of time needed to make the Pacific route and thus add greatly to the cost.

These commenters also claimed that 70 miles was not necessary to achieve the air quality benefits of moving activity farther from shore. According to a report prepared by Systems Applications International for the Pacific Marine Shipping Association, air quality benefits can be obtained by keeping ships at least 25 miles from shore[2]. This report claims

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[2]Analyses of UAM Wind Trajectories and Impacts of Offshore NOx Emission on Ozone Levels in the South Coast Air Basin, prepared for Pacific Marine Shipping Association by Systems Applications International, August 8, 1994.

that emissions that occur 25 miles or farther out from shore have only a minimal effect on South Coast air quality because the wind at that distance blows parallel to the shore.

The Ports assert that a 20 percent reduction in NOx emissions can be achieved if ships that use the San Pedro Bay ports stay at least 25 miles from shore when navigating in waters Northwest of the Ports.

Anthony Taorimina of the Port of Hueneme believes that the efforts to keep ships out of Ventura County should not be linked to the fee structure program. It should be a stand-alone operational requirement for deepdraft vessels transitting Ventura County's coastline.

Additionally, EPA received comments from the Department of Defense noting that the area around the Channel Islands is used as a missile test range. The Navy stated that there are many very sensitive pieces of equipment located in this area. The Navy also asserts that this is the best area for missile testing in the world. Currently, marine vessel operators are warned when testing is going on and are advised to avoid the area.

Response

Given the importance of both shipping and the test range, EPA is deferring a determination of the detailed measures necessary to reduce emissions from shipping that affect Ventura and South Coast air quality attainment, pending the collection of additional data. Further information about ship engine emissions and control, ship scheduling and routing, including the present procedures for control by the Navy of use of the Point Mugu Sea Range for select vessels at times when the range is not in use by the Navy and the distribution of emissions across the vessel population, may help in determining the nature and extent of needed control measures. In addition, EPA may benefit from ongoing Coast Guard evaluations of other safety concerns with respect to Pacific coast shipping. The goal of using data from these studies is to determine the most cost effective and least disruptive way to reduce shipping emissions of NOx in the South Coast by 30 percent and limit NOx emissions from shipping in Ventura to no more than four tons per day.

EPA, CARB, local air districts, and others are planning a 1996-1997 study of the formation of ozone in the southern portion of California. The scope of the study will be determined by the availability of funding, but may include a larger domain than is currently available for the Ventura Basin. The study may be able to better characterize the transport of pollutants in Southern California. Information from the study may be useful in assessing the impact of shipping vessels on ozone concentrations in Ventura and Los Angeles. Any pertinent information derived from the new study will be incorporated into the analysis of the effects of shipping emissions. In particular, the EPA and CARB in its State Implementation Plan may modify this four ton per day requirement based upon a finding of this study that a different emissions limit will be sufficient to attain the health-based ozone standard in Ventura County by the CAA deadline.

Further, EPA will convene a process to share shipping test data, to assess current and alternative vessel routing patterns, including any current vessel travel through the sea range, and to evaluate any new modeling or meteorological data. EPA, in consultation with the Navy and the Coast Guard, the California Air Resources Board, the Ventura County Air Quality Management District, the South Coast Air Quality Management District, and affected industries, will make determinations of control strategies based on this new information by August 14, 1997 and publish the results immediately thereafter. A proposal will be completed within six months of that determination and final rule will be completed within one year after that proposal.

EPA is not prejudging the results of this work. The effective date of the control measures and monitoring of voluntary compliance will not begin until at least June 1, 2001. It is important to arrive at control strategies as quickly as possible with the benefit of additional information and with the input of all interested parties.

## Inventory Issues

### Comments

EPA received comments from the Ports and marine vessel owner/operators that the inventory used by EPA and the SCAQMD overstated the contribution of marine vessel emissions to the South Coast NOx inventory. No one commented on errors in the inventories for Ventura.

Specifically, the inventory prepared by the Ports shows that a large portion of marine NOx emissions occur while cruising, contrary to the Booz-Allen inventory estimate on which EPA and SCAQMD relied. According to the Booz-Allen inventory, 58 percent of the 33 tons per day of NOx emissions attributable to ship emissions occur during hotelling and 28 percent occur during cruising. The Ports did their own estimate of the relevant inventory and concluded that 57 percent of the 18 tons per day of NOx emissions occur during cruising and only 27 percent occur during hotelling. The Ports' inventory implies that, since a larger portion of NOx emission levels are due to cruising activity, area NOx levels can be significantly reduced by moving cruising activity farther out to sea.

### Response

The differences in the size of the NOx inventory and the proportions attributable to cruising occur mainly as a result of assumptions used for calculating hotelling emissions. SCAQMD assumed that ships hotel for longer periods of time and use main engines instead of auxiliary engines while hotelling. In addition, SCAQMD estimated total NOx levels by using average ship characteristics, while the Ports relied on the actual characteristics of ships that used the Ports in 1990. However, the Ports made some assumptions that resulted in smaller engine loading factors.

The SCAQMD has tentatively revised its estimate to 24.3 tons NOx are emitted per day, 40 percent of which is attributable to cruising and 48 percent of which is attributable

to hotelling. EPA is using these adjusted figures, to which CARB has also concurred in theory, for this final program. The SCAQMD has released a request for proposals to improve the inventory and EPA is participating in evaluating those proposals.

Other Reductions

Comments

The Ports suggest that in addition to relying on the natural turnover to ships meeting IMO standards and a rerouting of the shipping lane, NOx emissions required under the FIP could be achieved by three additional measures. First, the Ports propose a 15-knot speed limit within 10 miles of the port entrance. The Ports claim this would reduce NOx emissions by 1 percent. Second, the Ports propose operational changes for tugs, which are expected to produce a 1 percent reduction in NOx emissions. The tugs would be required to cold iron when moored at their home base for four or more hours; when they are away from their home base and are moored for four or more hours, they would be required to turn their engines off. Finally, the Ports propose to take a 1 percent credit for various port infrastructure improvements already made or currently under construction.

Several commenters mentioned a potential credit program for the ports similar to that for non-road equipment proposed by SCAQMD. Marine diesel engine boat owners would be allowed to utilize any emission reduction technology which results in real emission reductions. Furthermore, the program could include a selective reduction of speeds within harbor confines which do not impact work performance.

Anthony Taorimina of the Port of Hueneme states that any vessel speed requirements need to be flexible, so as to balance the emissions savings with the costs associated with increasing vessel transit time. Also, a major reduction in speed, coupled with a relocated shipping channel that is extremely far out to sea may drastically impact trade routes and vessel schedules so as to make certain ports uncompetitive.

Response

Finally, EPA believes that the NOx emission reductions associated with these three elements of the Ports' alternative program, 1 percent from a 15-knot speed limit, 1 percent from tugs cold ironing, and 1 percent from various port infrastructure improvements, seem reasonable. EPA has included them in its final rule.

Specifically, several studies have indicated that NOx emissions can be reduced as much as 40-45 percent by reducing the steady-state loads of marine engines, which is achieved by reducing cruising speeds[3]. Unfortunately, speed is an imperfect indicator of

[3]Letter to Donald W. Rice, Director of Environmental Management, World Port LA, from Zorik Pirveysian, Program Supervisor, Planning, Transportation, and

the load on an engine and therefore the benefits from this program are unlikely to be higher than the one percent predicted. EPA has recommended speed control in the final rule, but only within the port area to avoid increasing time sufficiently to create excessive costs. If speed reductions are identified in the study described above as an appropriate control strategy for other areas, they will be expanded during the follow-on rulemaking stage.

With regard to the Ports' infrastructure improvements, the size of the credit (1 percent) appears from EPA's analysis to be only a small part of the NOx emission reductions anticipated to result from these projects. Unfortunately, given the nature of the projects and the speculative status of some of them, it is difficult to give more than this amount of credit.

Finally, with regard to the credit for operational changes for tugs, while it is arguable that these credits should be taken under the nonroad portion of the FIP, EPA believes that this credit is appropriate since it pertains to the actual in-port operations of these tugs and not to their engine characteristics.

## Engine Standards

Comment

Bob Kleist of the Maritime Coalition for Clean Air supports national emission standards for marine engines utilized in marine craft based in national waters, such as tugs, work boats, tour boats, fishing vessels, and diesel engine recreational boats, since national standards do not disadvantage particular areas. Anthony Taorimina of the Port of Hueneme recommends that any US regulations that are more strict than international regulations be implemented at the national level and must be less stringent than those proposed in the FIP.

The Ports assert that a 7 percent reduction in NOx emissions can be achieved from the implementation of the IMO NOx emission standards. These emissions standards are anticipated to apply on a world-wide basis to all new ships built after 1999[4]. The Ports state that the 7 percent reduction in the NOx inventory can be achieved from the natural turnover of ships. Over time, more and more of the ships that call on these ports will be built to meet those IMO standards.

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Information Management,
South Coast Air Quality Management District, dated August 25, 1994.

[4]The IMO proceedings are not yet completed; implementation of the standards is expected for 1999 or 2000.

Response

EPA has proposed national standards for marine engines (November 9, 1994; 59 FR 55930). There are no California-only standards finalized in the FIP. However, Congress gave California authority to regulate new marine engines sold in California if they deem it appropriate and the regulation meets the criteria set out for a waiver of federal preemption (See Section 209 of the Clean Air Act).

## Alameda Corridor Project

Comment

Assemblywoman Betty Karnette, Gill V. Hicks of the Alameda Corridor Transportation Authority and Geraldine Knatz of the Port of Long Beach raised a concern that the FIP program would have an adverse impact on the Alameda Corridor Project. That project will result in an estimated 28% reduction in emissions from trains and trucks. However, funding for the project is contingent on user fees from the ports that assume a growing level of cargo moving across the docks. If that level of cargo diminishes because of the FIP program, then the Alameda Corridor project cannot be funded, and the associated emission reductions will not occur.

Response

The Alameda Corridor Project is a perfect example of why the local governments are much better placed than EPA to develop clean air plans. This project will have significant emissions benefits, however, it will also cost many millions of dollars and change the face of several neighborhoods. The project needs to be developed and implemented on a local basis. For this reason, EPA could neither require nor credit the program in the FIP. However, we have tried to ensure that nothing in the final FIP will jeopardize the future of the project.

## Procedural Issues

Comment

Assemblywoman Betty Karnette expressed concern that the maritime components were not published with the original rule put forward by the Agency. In light of this, and the economic concerns, she suggests that the ports section be separated from the rest of the FIP, so that dramatically different strategies can be worked out with ports, shippers, railways, truckers and environmentalists.

Response

While much of the ports emission reduction strategy and enforcement of that strategy will be worked out through a longer term and public process, EPA must respond to the

claim that because the regulations were not published with the preamble that the program should be delayed. The regulations were merely codification of the preamble discussions and therefore notice was given of the requirements by the preamble. Draft regulations were made available to both ports and several shippers associations prior to the public hearings and placed in the docket to this rulemaking. These regulations were commented upon by the potentially regulated parties and their comments were taken into account in drafting the final rule. Thus whether or not there was constructive notice through the Federal Register, there was actual notice and comment on the regulations sufficient to have finalized them.